CENTRE OF BIOLOGICAL ENGINEERING
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Bacterial Nano Cellulose - innovative Biopolymer in Research and Application

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Bacterial cellulose (BC) is a nanofibrilar polymer produced by strains such as *Gluconacetobacter xylinus,* one of the best bacterial species for both academic as well as commercial exploitation, given the highest yields in cellulose production. This biopolymer sums the well-known plant cellulose properties with the outstanding features of nano-scale materials; among them: high crystallinity, ultrafine fiber network, high tensile strength in the wet state, the possibility to be shaped into three-dimensional structures during synthesis (in situ), and biocompatibility (in vitro and in vivo). These properties have attracted an ever-growing attention of both academia and industry, where studies demonstrate the use of BC in a wide range of applications such as biomedical and pharmaceutical industry, acoustic and filter membranes, biotechnological devices and in the food and paper industry.

This presentation aims to review the main features of BC, with focus on its modifications and potential applications. This will be followed by an overview of the main strategies concerning the large-scale production of this biopolymer. In fact, the general failure of a large-scale commercialization of BC seems to be mainly caused by the low yields obtained and high production costs associated using standard culture methods (i.e. static culture conditions). New fermentation strategies have been attempting to contradict such paradigm, to potentially help in delivering microbial cellulose to the market at competitive costs.

Following this review, examples concerning the main research activities of our research group will be presented. The FUNCARB - **FUN**ctional **CARB**ohydrates Nanobiotechnology Group, integrates the Center of Biological Engineering (CEB) of Minho University, a part of the Associated Laboratory IBB. Our research group operates in the fields of Biotechnology and Biomedical Engineering, aiming at developing new biomaterials and tools for biomedical application, based on carbohydrates. Polysaccharides currently used in our group include bacterial cellulose, dextrin, hyaluronic acid, chitosan and mannan.

References

[1] Andrade FK, Pertile RAN, Dourado F, Gama FM, "Chapter 18 - Bacterial Cellulose: properties, production and applications" *in* "Cellulose: Structure and Properties, Derivatives and Industrial Uses", Nova Science Publishers, Inc (2010), New York, (ISBN: 978-1-60876-388-7); pp. 427-458.